

Application protocol guide for LALCIDE® CHONDRO

Focus: European and glossy buckthorn

LALCIDE CHONDRO

Application Considerations

Time of Year

Application is recommended in late spring to early summer when buckthorn is fully finished leafing out and conditions are conducive to fungal growth and infection. Typically mid June to early July is the optimal window, however exact timing will vary by geographical location and associated growing degree days.

Shelf Life and Temperature Considerations

Product should be stored at 4°C and used within 90 days of the date of manufacture. To prevent contamination store the product away from food or feed.

When the product is on site for use, store in a cooler out of direct sunlight. Once a container is opened, the entire contents should be used.

Weather

Do not apply if a heavy rain is forecasted within 48 hours of application.

Overstory

If operations for control include cutting stumps, it is recommended to have an overstory species present which would provide some shade to allow for incubation and colonization of Lalcide® Chondro. An example would be in a woodland where the overstory is comprised of desired tree species and the understory is dominated by buckthorn. In this case only the buckthorn would be removed and the mature trees would remain to provide shade.

If operations for control include girdling stems, then the buckthorn canopies of the girdled stems would provide shade to optimize fungal colonization. It is expected for canopies to remain live for the majority of the growing season post girdling.

Product Application Considerations

Product is typically applied manually via a squeeze bottle with a nozzle. Bottle should be shaken prior to use. Product should be applied within 30 minutes of cutting or girdling. Follow all label and SDS recommendations for product handling and application including PPE. Must be a licensed applicator to apply the product.

Application to Cut Stump

Cut stump operations will either leave cut tops on site, or haul them. Regardless, it is imperative that each cut stump be treated with Lalcide® Chondro according to the labeled recommendations including treatment within 30 minutes of cutting. Developing a methodology to ensure no stumps are missed and/or no brush is dragged over freshly treated stumps which could result in wiping the product off is very important.

- Cut stem height should be kept low (approximately 10 cm or less)
- Follow all label and SDS recommendations for product handling and application including PPE
- For stems which are:
 - Less than 6 cm in diameter: Apply a thin layer of Lalcide® Chondro to the entire cut stump surface (Figure 1).
 - Greater than 6 cm in diameter: Lalcide® Chondro can be applied in a wide band which covers an outer ring of the cut surface including bark, phloem, and sapwood, ensuring complete coverage of that area around the circumference of the stump surface (Figure 2)
 - Multistem: All cut stems of buckthorn need to be treated, the main stem and any/all copied stems (Figure 3)
- Monitor and record weather on the day of application, and for two days following application to make note for future efficacy assessments.



Figure 1. Buckthorn stem less than 6 cm diameter with Lalcide® Chondro applied to entire cut surface



Figure 2. Buckthorn stem greater than 6 cm diameter with Lalcide® Chondro applied to outer edge only including bark, cambium, and sapwood



Figure 3. Example of a multistem buckthorn, where each cut stump surface would require treatment with Lalcide® Chondro

Application to Girdle

Girdling stems requires that the entire bark and cambial layer be removed in the girdling strip/band and that there is no intact cambium left around the circumference of the stem. This will disrupt the transport of water and nutrients from canopy to roots. Even if a small strip is left, efficacy can be greatly reduced/compromised.

- Follow all label and SDS recommendations for product handling and application including PPE
- The girdling band should be kept fairly low (~10 cm or less) to the ground. The band should be a minimum of 3 cm wide.
- There are specific tools for girdling trees that can be purchased, such as the “bark blaster” (Figure 4, b). These can be very effective when the majority of buckthorn are single stem. In multistem, or very dense stands, it can be difficult where there may not be enough space between stems to swing the handle around the full circumference of the tree.
- A combination of a small hand saw and paint scraper can also be used (Figure 4, a). The hand saw is used to make two complete circle cuts at the width of the paint scraper all the way around the tree cutting down into the sapwood. The paint scraper is then used to peel the bark off in between (Figure 5).
- Once the girdle is complete, the wound should be treated in its entirety with Lalcide® Chondro according to the labeled recommendations including treatment within 30 minutes of girdling (Figure 6). The product comes in a squeeze bottle, however application could also be done utilizing a paint brush when applying to a girdled wound. Ensure the product covers the entire girdled area, particularly the bottom edge.



Figure 4. Example of girdling tools (a) hand pruning saw with paint scraper, (b) bark blaster



Figure 5. Example of a stem post girdling. Girdling completed with hand saw and paint scraper with bark removed in one strip



Figure 6. Example of girdled buckthorn stems with Lalcide® Chondro applied to the entire girdling wound

- If the buckthorn is multistem, then care must be taken that all stems are completely girdled. Therefore the girdle may need to be done slightly higher than recommended if the bark between the stems is fused making it impossible to remove with girdling tools. If the multistem clump is impossible to girdle each stem, consideration can be taken to cut one (or more) stem(s) and apply Lalcide® Chondro to the cut surface, in order to free up the other stems for complete girdling + Lalcide® Chondro.
- It is expected for the canopy to remain alive for the majority of the remainder of the growing season, and that shoots will develop on treated stems

Efficacy Considerations

- The active ingredient of Lalcide® Chondro is a naturally occurring fungi, *Chondrostereum purpureum* (Cp). Due to its biological nature, it takes time for the fungi to colonize the stem that it has been applied to. Therefore efficacy will become more pronounced over time, especially at the 12 and 24 month assessment periods. Careful consideration of weather should be taken when applying the product to ensure optimal conditions for fungal colonization.
- Shoots will mostly likely form on treated stumps and girdled stems, however over time these shoots are typically affected by silver leaf disease (SLD) and succumb to mortality (Figure 7 & 8). SLD is caused by an enzyme released by the Cp which disrupts the middle lamella between the epidermal cells and palisade cells of the leaves, causing the two layers to separate. The change in cell arrangement results in a change of reflectivity of the leaf, resulting in a silvered appearance.



Figure 7. Efficacy assessment 4 months post treatment at a research trial in Quebec where photo on the LEFT: shoots from an untreated control stem (girdled with no product) and RIGHT: shoots from a girdled + Lalcide® Chondro stem showing signs of silver leaf disease and decline



Figure 8. Examples of stems treated with Lalcide® Chondro with resulting shoot and total stem mortality over time. LEFT: stem girdled + Lalcide® Chondro at 16 months post treatment. RIGHT: cut stump + Lalcide® Chondro at 24 months post treatment

- Having an overstory to create some shade to the treated area is beneficial to fungal colonization:
 - ✓ Girdle Operation: Remaining canopy of the girdled trees
 - ✓ Cut stump: Overstory of dominant tree canopy (Figure 9)



Figure 9. Example of a red pine (*Pinus resinosa*) plantation with a buckthorn dominated understory, where an area of buckthorn was cleared and red pine will provide some shade to treated stems.